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(54) IMPROVEMENTS IN AND RELATING TO
 SHRINK-FILM WRAPPING AND PACKAGING

(71) We, TETRA PAK INTERNATIONAL AB, a Swedish corporate body of Fack S-221 01, Lund 1, Sweden, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the shrink-film wrapping or packaging of one or more articles, and aims at the provision of a simple method of producing packages which will be readily openable, when required, for access to the contents.

The invention consists in a method of shrink-film wrapping or packaging wherein a length of a web of shrinkable plastics film, and while being drawn from a continuous roll, is applied as a wrapping or covering to one or more articles being wrapped or packaged, to be subsequently shrink thereon, and wherein prior to or while being so applied to the article(s) the length of web is provided with a line of weakness to facilitate rupture of the shrunken web on the finished package for access to the contents.

The invention further consists in apparatus adapted to carry into effect the method set out in the next preceding paragraph comprising a roll of continuous web of shrinkable plastics film, means for presenting to a length of the web being drawn from the roll, an article or assembly of articles to be wrapped or packaged, means for forming in said web a line of weakness after the web has been drawn from the roll but before or during the time the web is applied as a wrapping or covering to the article(s), means for sealing the web to encircle the article(s), and means for shrinking the web to cause it to embrace the article(s).

The invention will be more fully understood from the following description of

forms (given, however, merely by way of example) which it may assume, and this description will be more readily followed by reference to the accompanying drawings wherein:

Fig. 1 represents the procedure of shrink-on film wrapping to which the invention relates:

Fig. 2 represents in side view a sealing device for shrink-on film wrapping apparatus provided with a device for carrying out the method in accordance with the invention:

Fig. 3 represents in side view apparatus incorporating another device for carrying out the method in accordance with the invention and

Fig. 4 represents in perspective a number of articles, wrapped in a shrink-on film in accordance with the method of the invention.

In Fig. 1 is shown a known procedure for wrapping articles in shrink-on film. The articles 1 are conveyed on a roller way 2 or a similar transport device to a collecting board 3. From a roll 4, located above the article is drawn off a web 5 of shrinkable plastics film and the end is bonded to the end of another web 7 of plastics film 7 drawn from a roll 6 located underneath the said transport device 2, 3. As a pre-arranged array of a selected number of articles is advanced the film 5 and 7 fold against the top and bottom surfaces of the array, and the webs are bonded together along a transverse seam or zone across the rear face of the array, which is thus encircled by the web. The sealing is carried out by a sealing die 8 and a counter-pressure die 9 serving as a holding-up tool. The sealing die may be constantly heated and the sealing die and/or the counter pressure die are adapted to be moved towards or away from one another. For the transport of the packages 10 so wrapped a

further roller way 11 is provided to convey the wrapped packages to a conveyor belt 12. This conveyor belt, which customarily consists of an endless band, carries the articles wrapped in the film into a shrinkage tunnel 13 at a rate adapted to ensure the desired shrinking operation. Underneath the conveyor belt, and beyond the shrinking tunnel 13 a cooling fan 15 is provided to accelerate the cooling of the plastics film wrapping of a finished package 14.

In Fig. 2 is shown, in enlarged view, a sealing die 18 and a counter-pressure die 9 in separated positions after a welding operation. The sealing die is provided with sealing strips 16 of electrical resistance material, to provide heating surfaces for the welding operation when sealing the plastics films. For this sealing heat and pressure are applied along a zone of the combined plastics films 5, 7. The sealing die is also provided with a recess 17 between the sealing surfaces 16, in which recess is located a knife 18, for example in the form of a heated wire, for severance of the two plastics films 5, 7 after the welding operation. In the sealing die cooling ducts 19 are also provided.

As indicated above it is a feature of the invention to provide in the wrapping films, before or during the operation of encirclement thereby of the article(s) being wrapped, lines of weakness to facilitate tearing of the covering when it is desired to open a finished package. Such lines of weakness may conveniently be lines of perforations.

In carrying the invention into effect in one convenient manner, the sealing die, as shown in Fig. 2, is provided with a yoke 20 which is spring-loaded by a spring element 21, and on the yoke, serrated knives 22 are adjustably mounted by screws or a similar support 23. The knives 22 incise lines of perforations through the plastics films 5, 7, being provided with serrated edges so constructed that perforations suitable to facilitate tearing of the plastics material are effected. A suitable device for the purpose is a knife which has 90° serrated edges. The counter-pressure die 9 has counter-pressure surfaces 24 made of a suitable material and a recess 25 between these surfaces to allow passage of the cutter element 18 into the recess when the films are to be severed. A severance of the plastics films is carried out when a film wrapping is to be separated from the films 5 and 7 rolled off the magazine rolls 4, 6.

It will be appreciated from consideration of Figs. 1 and 2 that as articles advance on the roller way 2 and platform 3 the films 5 and 7 are sealed together in front

of the assembling articles between the die components 8, 9 which at the same time form a line of perforations adjacent and parallel to the sealed zone in each film. Similarly after an assembly of a pre-arranged number of articles has passed between the die elements 8 and 9, (opened apart for such purpose) the films 5 and 7, which have become wrapped across the upper and lower surfaces of the articles, are then sealed together behind the assembly, where again lines of perforations are cut in the films 5 and 7 adjacent to the new sealing zone. It will be apparent that a single sealing operation on the films between successive assemblies of articles completes the encirclement by plastics film of a leading assembly of articles, and commencement of such encirclement of the following assembly of articles, and that the coverings of both assemblies are simultaneously perforated, respectively by one of the two knives 22. The sealing line 30, and lines of perforations 33 effected by the die member shown in Fig. 2 may be seen in Fig. 4. Each package when encircled by web material and detached from the films 5 and 7, is advanced on rollers 11 and the conveyor 12 through the shrinking chamber 13, and the finished package 14 cooled by the fan 15.

Alternatively the perforation of the plastics films 5, 7 may be carried out during the travel of the films from the magazine rolls 4, 6 to the article (5) being wrapped. In this case as shown in Fig. 3 a double-edged knife element 27 is adapted to perforate the plastics film from one side of the same. On the other side of the plastics film an anvil or support 28 is provided. Such a knife element is preferably adjustable and located so that the lines of perforations are formed in appropriate positions in the plastics film having regard to the shape and size of the assembled articles. Such perforation lines may, if desired, be located in several places on the wrapping, for which reason a further double-edged knife 29 may be provided, as can be seen in Fig. 3.

Fig. 4 indicates the different perforation lines provided by the different knives 22 and 27. Between the perforation lines 33 or 34 a strip of material 35 and 36 respectively is defined which constitutes the tear strip removable by an operator.

As will be apparent from Fig. 4 the width of the films 5 and 7 is greater than the length of the assembly of articles being wrapped and the edge zones of the webs projecting beyond the ends of an assembly, during a shrinking operation are drawn in against the ends of the assembly, providing a substantial covering therefore, as shown in Fig. 4, and turning in the lines of per-

foration 35, 36, and the seal lines 30, 31, which facilitates tearing open the wrapping from the end of the package.

The invention is not limited merely to the embodiments described above, but may be modified within the scope of the appendant claims. Thus it is usual, for example, for the articles 1 to be conveyed to the welded films 5, 7 by means of a feeding device. As a result the front face as well as the top and bottom of the assembled articles are enveloped by the plastics films 5, 7. The plastics films may consist of polyethylene, polypropylene or laminate containing such plastics film material, or of oriented plastics film material of this kind.

It is within the scope of the invention to modify the methods described for the treatment of the plastics film in a so-called shrunk-on film wrapping. Thus the knife element 22, 27, 29 may be arranged so that the perforation of the plastics film takes place from the opposite side of the film with regard to that shown in the drawings. The path of movement of the plastics film between the magazine rolls 4, 6 and the actual point of attachment to the article(s) being wrapped may also be different from that shown in the drawings and it is customary in this connection to use guide rolls or rails to impart a suitable direction of movement to the film. In accordance with the embodiment as shown in figure 2 only one knife 22 may be provided for perforating the plastics films 5, 7 which are in the process of being welded together. It may also be arranged that one of the dies, preferably the counter-pressure die 9, shall be fixed, whilst the other die 8 is movable. The article(s) being wrapped in the plastics film are usually conveyed to the joined plastics films 5, 7 by a feeding device, as a result of which, as mentioned above, the front side as well as the top and bottom of the assembled articles are enveloped by the plastics films 5, 7 during the feed process, whilst the rear side is wrapped up by the closure of the die elements. Furthermore the knife element may be arranged so that it perforates the plastics film to form either perforation lines running parallel with one another or perforation lines diverging from one another.

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WHAT WE CLAIM IS:—

1. A method of shrink-film wrapping or packaging wherein a length of a web of shrinkable plastics film, while being drawn from a continuous roll, is applied as a wrapping or covering to one or more articles being wrapped or packaged, to be subsequently shrunk thereon, and wherein prior to or while being so applied to the article(s) the length of web is provided

with a line of weakness to facilitate rupture of the shrunk web on the finished package for access to the contents.

2. A method as claimed in Claim 1 wherein the web is formed by bonding together two webs drawn from separate rolls.

3. A method as claimed in Claim 2 wherein the two webs are bonded together on opposite sides of the article(s) being wrapped or packaged in order to encircle the said article(s) prior to shrinking.

4. A method as claimed in Claim 1, 2 or 3 wherein one or more lines of weakness are formed in a portion of the (or each) web in the course of movement from its roll to the article(s) being wrapped or packaged.

5. A method as claimed in any of Claims 1-4 wherein the (or each) line of weakness comprises a series of perforations in the film.

6. A method as claimed in any preceding claim wherein the film is formed with two lines of weakness defining a detachable strip between them.

7. A method as claimed in any preceding claim wherein the (or each) line of weakness extends transversely of the film.

8. A method as claimed in any preceding claim wherein the location of the line(s) of weakness is selected, having regard to the size and shape of the article(s) being wrapped or packaged, to ensure that on the finished package the shrunk film will be rupturable at an appropriate, convenient position.

9. A method as claimed in any preceding claim wherein the film is provided with two divergent lines of weakness.

10. A method as claimed in any preceding claim wherein the article(s) being wrapped or packaged are advanced to abut by its leading surface on the web extending transversely of the path of advance, and thereafter further advanced to cause the web to fold against adjacent faces of the article(s) whereafter the web is folded inwards from each of said adjacent faces and bonded to itself in the vicinity of the trailing surface of the article(s).

11. A method as claimed in Claim 10 when appendant to Claim 2 or to any of claims 3-9 when appendant to Claim 2 wherein the zone of the web bonded to itself adjacent to the trailing surface of the article(s) is severed to separate the wrapped or packaged article(s) already surrounded by the web, and to maintain the two webs in bonded relationship in readiness for a succeeding operation.

12. Apparatus adapted to carry into effect the method as claimed in any of Claims 1-11, comprising a roll of continuous web of shrinkable plastics film,

means for presenting to a length of the web being drawn from the roll, an article or assembly of articles to be wrapped or packaged, means for forming in said web a line of weakness after the web has been drawn from the roll but before or during the time the web is applied as a wrapping or covering to the article(s), means for sealing the web to encircle the article(s), and means for shrinking the web to cause it to embrace the article(s).

13. Apparatus as claimed in Claim 12 wherein the means for forming a line of weakness in the web are adapted to provide perforations therein.

14. Apparatus as claimed in Claim 12 or 13 wherein the means for forming a line of weakness comprise a perforating knife.

15. Apparatus claimed in Claim 12, 13 or 14 comprising two means for providing two adjacent lines of weakness in the web.

16. Apparatus as claimed in any of Claims 12-15 wherein the means for providing the line(s) of weakness extend substantially transversely of the web.

17. Apparatus as claimed in any of Claims 12-16 wherein the means for

providing a line of weakness are associated, and operate, with the means for sealing the film as a wrapping of the article(s).

18. A method of shrink-film wrapping or packaging substantially as described herein with reference to the accompanying drawings.

19. Apparatus for shrink-film wrapping or packaging substantially as described herein with reference to the accompanying drawings.

20. One or more articles encased in a shrink-film wrapping or packaging material applied by a method, or by use of apparatus, substantially as described herein with reference to the accompanying drawings.

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Fig.1

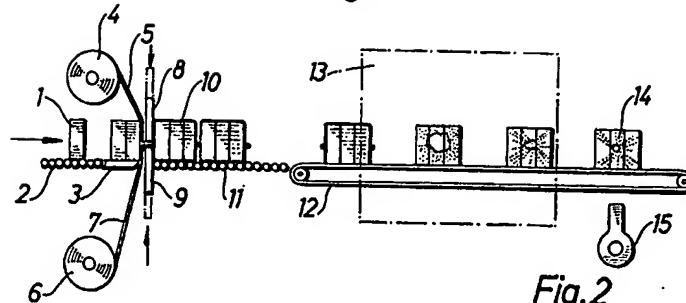


Fig.2

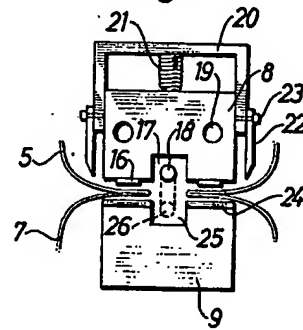


Fig.3

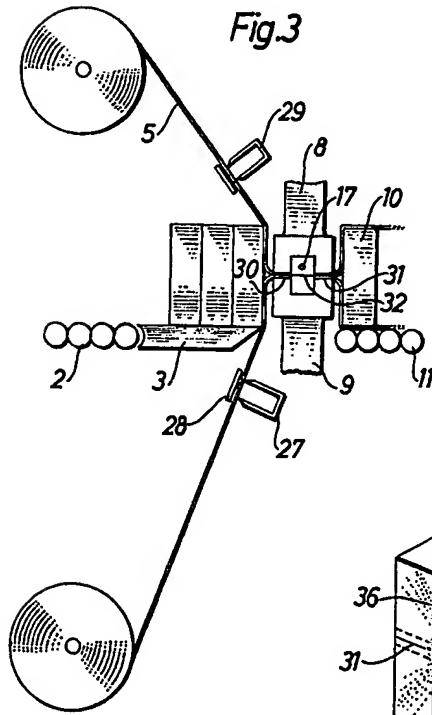


Fig.4

